PATENT SPECIFICATION (11) 1 549 403

1 549 403

(21) Application No. 40304/76 (22) Filed 28 Sept. 1976

(31) Convention Application No. 7 511 878 (32) Filed 9 Oct. 1975 in

(33) Netherlands (NL)

(44) Complete Specification published 1 Aug. 1979

(51) INT. CL.[2] F16G 1/24

(52) Index at acceptance F2Q 2B2A1

(54) IMPROVEMENTS IN OR RELATING TO V-BELT TRANSMISSION

(71) We, Van Doorne's Transmissie B.V., a Dutch body corporate of Dr. Hub van Doorneweg 120, Tilburg, the Netherland, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a belt drive with V-shaped pulleys.

The type of drive to which the invention relates is well known and comprises a driving belt composed of driving elements of substantially non-compressible material slidably arranged on an endless carrier, and at least two V-shaped pulleys over which the belt is passed, each driving element having at least two converging side faces arranged to co-operate with the inner surface of the side plates of the pulleys. Such a drive can be used for transmitting a relatively large torque between V-shaped pulleys having variably spaced side plates, whereby the transmission ratio is infinitely variable. Unlike a conventional driving belt, the torque is transmitted by a pushing force, which is transmitted by the array of driving elements. One condition is, of course, that the tensile stress in the carrier must always be greater than the pushing force exercised by the driving elements arranged on the carrier. The carrier may consist, for example, of one or two metal bands or packets of bands.

A transmission of this kind often operates in surroundings rich in oil, the result of which is that, in spite of the great contact pressure, an oil film may be formed between a side face of a driving element and a side plate of a pulley, which has an adverse effect on the contact between the driving element and the pulley, required for transmitting the force.

It is an object of the present invention to provide a drive in which, in spite of the presence of oil, proper and effective contact is ensured between the driving elements and the pulleys.

According to the present invention, there is provided a drive arrangement comprising a driving belt composed of driving elements of substantially non-compressible material slidably arranged on an endless carrier, and at least two V-shaped pulleys over which the belt is passed, each driving element having at least two converging side faces arranged to co-operate with the inner surface of the side plates of the pulleys, characterized in that either the converging side faces of the element or the inner surface of the side plates or both the converging side faces of the element and the inner surface of the side plates are formed as a non-continuous surface as hereinbefore defined.

By the term "non-continuous surface" we mean a surface which is generally plane but is provided at least in part with locally relieved or profiled areas or consists at least in part of porous material, to make it possible for any oil that is trapped between the side face of the driving element, which makes virtual line contact with the conical inner surface of a side plate of a pulley, to escape. Practice has shown that owing to the non-continuous surface of the side face or the side plate, the force is transmitted in an effective and reliable manner.

In some embodiments, the non-continuous surface is at least locally provided with recesses, for example in the form of grooves. Preferably these grooves have an oblique direction relative to the line contact between the driving element and the pulley, whereby, on the one hand, the side face makes contact with the pulley with a sufficient amount of surface area, and, on the other hand, oil is effectively carried off through centrifugal action.

In other embodiment wherein the non-continuous surface consists at least in part

of porous material, the porous material may be molybdenum, tungsten carbide, or ceramic material in the form of aluminium oxide, which material is preferably applied by spraying.

Some embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings. It is to be understood that the profiling or the porous layer applied to the side faces of the driving elements may also be applied to the inner surface of the pulley side plates.

In the accompanying drawings,

Fig. 1 is a diagrammatic representation of a driving belt transmission;

ment; and

Fig. 2 is a front view of a driving ele-

Fig. 3-6 are side views of a driving element, including partial sections on the line A of Fig. 2.

Referring to the drawings, Fig. 1 shows diagrammatically two pulleys 1, 2, between which runs a driving belt 3. Belt 3 consists of a carrier 4, on which are arranged a multiplicity of driving elements 5, which are slidable on the carrier. The carrier is formed of a number of metallic bands, arranged one around another.

Fig. 2 is a front view of a driving element, showing two sidefaces 6, 7. When element 5 has been placed on carrier 4, it can be secured by means of a pin (not shown), which is inserted through holes 8, 9, and is preferably fixed in one of them. The driving element can then slide relatively to carrier 4.

Fig. 3-6 show sideviews of driving element 5, showing several embodiments. Below each sideview is shown a part-sectional view on the line A of Fig. 2.

According to Fig. 3, oblique grooves 10 are formed in the sideface. According to Fig. 4, the sideface is provided with blind holes 11, and according to Fig. 5, grooves 12 of limited length are provided. In the embodiment shown in Fig. 6, the sideface is provided with a layer of porous material 13.

WHAT WE CLAIM IS:—

1. A drive arrangement comprising a driving belt composed of driving elements of substantially non-compressible material slidably arranged on an endless carrier, and at least two V-shaped pulleys over which the belt is passed, each driving element having at least two converging side faces arranged to co-operate with the inner surface of the side plates of the pulleys, characterized in that either the converging side faces of the element or the inner surface of the side plates or both the converging side faces of the element and the inner surface of the side plates are formed as a non-continuous surface as hereinbefore defined.

2. A drive arrangement according to Claim 1, wherein the non-continuous surface is at least locally provided with recesses.

3. A drive arrangement according to Claim 2, wherein said recesses are substantially parallel, obliquely directed grooves.

4. A drive arrangement according to Claim 1, wherein the non-continuous surface consists at least in part of a porous material.

5. A drive arrangement according to Claim 4, wherein said porous material is molybdenum.

6. A drive arrangement according to Claim 4, wherein said porous material is tungsten carbide.

7. A drive arrangement according to Claim 4, wherein said porous material is a ceramic material.

8. A drive arrangement according to Claim 7, wherein said ceramic material is aluminium oxide.

9. A drive arrangement substantially as described herein with reference to the accompanying drawings.

10. A driving element for a driving belt for use in a drive arrangement according to any one of the preceding claims, said driving element having side faces each of which is formed as a non-continuous surface as hereinbefore defined.

11. A driving belt for use in a drive arrangement according to any one of Claims 1 to 9, comprising driving elements according to Claim 10.

12. A driving element substantially as described herein with reference to Figure 2 and any one of Figures 3 to 6 of the accompanying drawings.

STEVENS, HEWLETT & PERKINS,
Chartered Patent Agents,
5, Quality Court,
Chancery Lane, London, WC2A 1HZ.

Reference has been directed in pursuance of section 9, subsection (1) of the Patents Act 1949, to patent No. 1 286 777.

Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1979.
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

1 549 403 COMPLETE SPECIFICATION
1 SHEET

This drawing is a reproduction of the Original on a reduced scale.

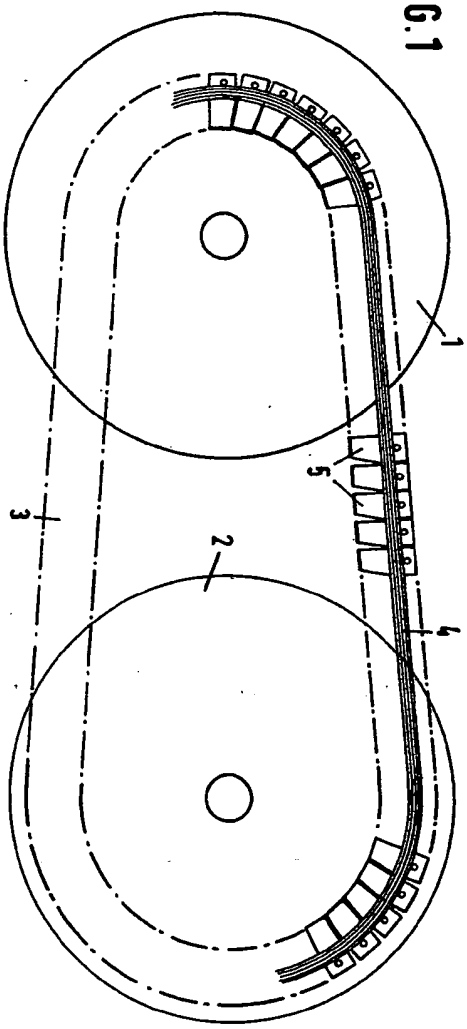

FIG.1

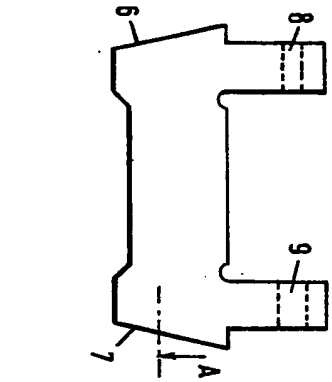

FIG.2

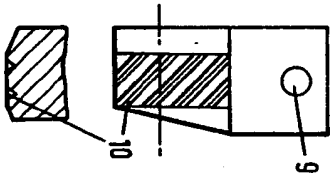

FIG.3

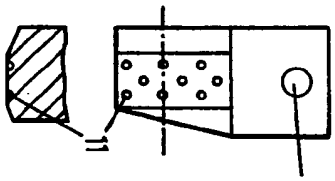

FIG.4

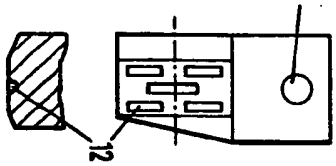

FIG.5

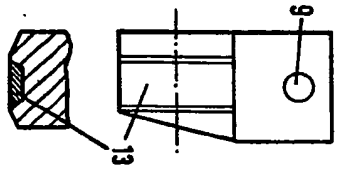

FIG.6